MUSICAL COMPOSITIONS BASED ON A STUDY OF THE FIGURATIVE AND TEXTURAL DIALECTIC IN SELECTED ART WORKS: MUSIC AS METAPHORICAL REFLECTIONS

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by

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ABSTRAK

Ramai komposer telah mencipta karya muzik dengan membuat rujukan kepada tema dan subjek dalam karya seni visual. Sejumlah komposisi muzik juga telah dikonseptualisasikan secara grafik, biarkan dari segi distribusi dan hubungan antara parameter-parameter muzik ataupun dari segi pembinaan formal dan struktural dalam dimensi masa. Tesis ini bertujuan untuk memformulasi suatu set kaedah-kaedah komposisi untuk menperolehi dan menterjemahkan ke dalam unsur-unsur muzik dari seni visual melalui analogi hubungan antara unsur-unsur grafik dalam karya visual yang terpilih. Kaedah penterjemahan ini berfokus pada hubungan khusus dan interaksi antara komponen-komponen figuratif dan tekstur dalam subjek-subjek grafik. Elemen-elemen grafik seperti figur, lineariti, tekstur dan warna dipetakan ke elemen-elemen muzik seperti motif melodi, pola ritma, tekstur kontrapuntal, harmoni dan warna nada bergantung pada hubungan figuratif dan tekstur dari setiap karya seni grafik. Dari tahap konseptualisasi yang ketat sehingga kaedah komposisi yang algoritmik, sebuah kanvas muzik akan digubah terdahulu sebelum dibentukkan ke dalam karya seni muzik yang terakhir. Perspektif figuratif dan tekstur yang diguna dalam pendekatan komposisi ini telah mendedahkan pelbagai kemungkinan dari segi tekstur dan struktur muzik, ekspresi idiomatik serta dunia bunyi yang jelas berbeza berbanding dengan pendekatan-pendekatan komposisi lain. Penemuan yang amat berpotensi dalam pendekatan komposisi ini, disebabkan oleh ciri-ciri eksperimental serta daya estetiknya, menawarkan pelbagai kemungkinan dalam komposisi muzik yang berdasarkan pemetaan imaginatif dan kreatif antara elemen-elemen visual ke dalam pelbagai perspektif ataupun model teoretikal dan saintifik muzik dan elemen sonik yang terus berkembang.

MUSICAL COMPOSITIONS BASED ON A STUDY OF THE FIGURATIVE AND TEXTURAL DIALECTIC IN SELECTED ART WORKS: MUSIC AS METAPHORICAL REFLECTIONS

ABSTRACT

Correspondences between the visual arts and the musical arts have inspired many composers to write music based on themes and subjects in specific visual art works. Many musical compositions have also been graphically conceptualised in regard to their distribution of and relationships between musical parameters as well as their formal and structural construction in time. This thesis aims to formulate a set of compositional methods that attempt to derive and translate into musical materials from the visual arts via an analogy of the relationships between graphical elements in selected visual art works. The methods of translation are focused on the specific relationships and interplay between the figurative and textural components in the graphical subjects. Graphical elements such as figures, linearity, texturality and colours are mapped onto musical elements such as melodic motifs, rhythmic patterns, contrapuntal textures, harmonic colours and timbres in each case depending on the figurative and textural construct of each graphical art work. From strict conceptualisation to the almost algorithmic compositional methods, a general musical canvas is first composed and then further moulded into the final aesthetic musical art work. The figurative and textural perspectives adopted in this compositional approach have opened up a variety of possible and unexpected musical textures and structures, idiomatic expressions and sound world that is markedly different from other compositional approaches. Promising discoveries in compositional approaches attributed to such an experimental mode and the aesthetic soundness of the compositional outcome offer possibilities in musical compositions based on the imaginative and creative mapping between visual features and relationships onto the ever-expanding theoretical and scientific models and perspectives of musical and sonic elements.

CHAPTER 1

INTRODUCTION

1.1 Thesis Statement

This thesis is an investigation into the viability of constructing several musical compositions based on a set of musical idioms through the appropriation of specific relationships and interplay between the figurative and textural components in a selection of artworks drawn across different historical eras and cultures. Can this "translation" of visual images into sound sculptures be undertaken to fresh new aural perspectives along with aesthetically effective and satisfying results?

1.2 Problem Statement

As much as they had learned from tradition, composers had often avoided regressing into well-established or past musical languages and idioms in search of contemporary artistic expressions that more closely reflects the life and sensual experiences in the world they inhabited. In order to fulfil this self-imposed artistic imperative of constantly exploring new ways of organizing sounds, they often look for fresh perspectives and also try to avoid stultifying clichés. The notion of the individual composer developing a personalised musical language based on specifically defined rules distinctly away from well-established past idioms of Western art music began to take root and flourished by the early 20th century. The possibilities of developing fresh compositional perspectives were further inspired by the encounter of indigenous music around the world. The most rigorous exploitation of new possibilities gained its notoriety in the compositional approaches by composers specifically belonging to the Second Viennese schools. Indigenous music sounded vastly different from that of the Western musical tradition due to musical principles nurtured by vastly different cultural landscapes and philosophies. On the other hand, the deliberate attempts of composers of the Second Viennese School to establish a new governing set of musical principles in the wake of the dissolution of the traditional musical tonal system have pointed

to a future of compositional approach with a penchant of rewriting or refining the rules for organizing musical sounds. Since then, many composers have ventured into rigorous self-discovery and also exposed themselves to fresh cultural as well as scientific perspectives in forging their own paths along the terrain of individualized organisation of sounds and idioms of musical dialect. What else can a composer bring to this already vast cultural treasure trove of music in our times? The answer is resoundingly multifarious as humanity has unfailingly proven to be able to reinvent itself on infinite terms! Nevertheless this thesis shall offer a thin slice of a composer's individual take and response to this all-pervading question in musical history.

1.3 Research Objective

1.3.1 The Role of Mental Images in the Cognitive Process of Musical Creation

Humans often use mental images to help procure a firmer grasp of intellectual concepts ranging from literal subjects to more abstract ideas and also to organize them into narrative, logical or inductive events and flows. Such mental images may sometimes be physically realized in case we may lose them in the fleeting realm of thoughts. When mental images are physically realized - be it a few scribbles on paper or meticulously drawn out in intricate graphic details - they may be regarded as no different from a highly valued visual artwork, notwithstanding the aesthetic qualities one may ascribe to any of the them. Since even the process of musical composition may involve a sort of visualization of musical subjects, their rhythmic and pitch permutations, temporal thrust and unfolding, as well as textural density in the visual form of musical notation, it prompts the question: Why not take directly from a source which is inherently visual, or graphical, as a subject from which one can extract a set of governing principles and relationships between its elements and re-appropriate them into an analogous systemic map for organizing musical elements? Hence the composer is led to consider the attractiveness of translating, or re-mapping selected works of the visual arts into corresponding musical works.

1.3.2 Research Objective

Hence, the main objective of this thesis is to look into the viability and hence formulation of suitable methods of translating or mapping a selection of visual artworks into their corresponding musical reflections or, one may even say, metaphoric images realized by musical means and elements.

1.4 Literature Review

1.4.1 Visual and Musical Perceptual Experiences

Since this thesis will touch upon the premise of the visual arts in relation to those of the musical arts, it warrants a prior investigation into the disparate and the shared elements of, as well as, the dialogue between these sister arts. It is a given fact that visual images excites us through our visual senses and that musical sounds are perceived through our auditory senses. On a deeper experiential level, our auditory and visual senses have always served us hand-in-hand in experiencing sequential, narrative and logical events to the more sublime or subjective sensual, emotive and cerebral perceptions of our existence and our surroundings. At times, these two senses are triggered by the same physical source; while at other times, they may be struck on by separate sources at separate times. And more interestingly, even when the physical sources of sensation were removed or rendered inaccessible to these senses, the perceptual experiences that occur in the mind as a consequence of these physical sensations can still be "felt", "seen" or "heard" in the mind's eyes and ears due to function of "memory". Thus, sometimes, we can hardly differentiate or separate what we experience in the mind as auditory experiences, as visual experiences or as simultaneous experiences of these senses or none at all! Due to this gray area of sensory experiences, the definition of whether an experience is visual, auditory or both falls solely on the judgement of the individual percipient. A musician may be more inclined to experience an auditory sensation when looking at a piece of visual art work whereas a painter may be predisposed to see images evoked in their minds when exposed to music. This often ambiguous duality of auditory and visual sensations had led to a plethora of musical works which have been - to put in the simplest term - "inspired" by some form of visual arts. Needless to say, on the

reverse, there are equally plenty of visual art works which were "inspired" by certain musical works. However, there has to be some underlying traits of each other's compositional elements that act as the "enablers" that facilitate such conceptual and perceptual exchanges and dialogues between these two sister art forms.

1.4.2 Common Traits between the Visual and Musical Arts

Studies in the critical perception of music and of visual designs in terms of aesthetic objects (Beardsley 1958, p.15-64) and their artistic form (Beardsley 1958, p.165-209) had helped us identify three of their most important traits:

(i) Signification and meaning

(ii) Structure, form, patterns and movements

(iii) Colours or Sounds (Synesthetic)

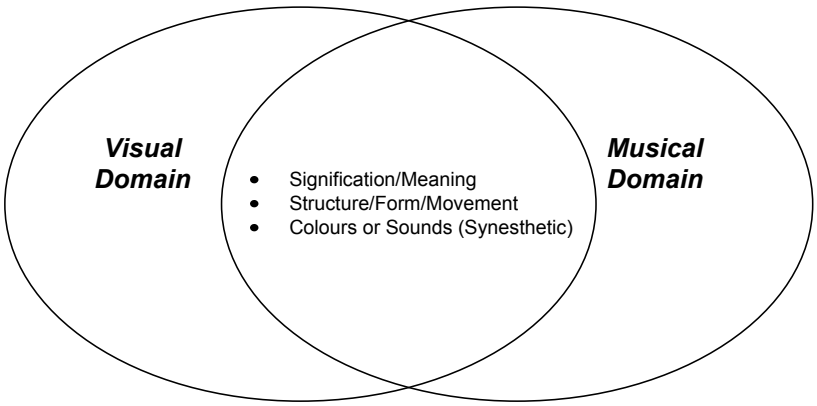


Figure 1.1: Common traits between the Visual Domain and the Musical Domain

One may see these traits as being common to both the visual domain and the musical domain. In Figure 1.1, they are shown within the overlapping region between these two ostensibly disparate domains. Pertaining to the first trait, the visual and musical arts are said to be able to express or convey certain "ideas of things". For example, a visual art work that shows a picture of a cuckoo directly evokes the idea of its subject - that of the cuckoo; Similarly a musical interval of a third that is an imitation of what a cuckoo sounds like, may also stand to signify the idea of the cuckoo by such association. Due to both of these art forms' ability to suggest the common idea of a thing or meaning, a relationship between two

ideas and even emotions, it provides a platform for one art form to restate something proffered by another. On the second trait, we can often ascribe structural and formal qualities to visual designs and to musical events. The composition of a piece of visual or musical art simply cannot come into being without a conscious manipulation of the basic elements that constitute the final aesthetic objects. Because of this, it is possible to associate structural forms and contours of visual designs such as lines and figures to those in music such as broken chords, intervals and melodies. Even with the absence of temporal qualities as found in music, graphical lines, shapes, figures and their orientations coupled with their positions on the canvas may also suggest implicit movements (Beardsley 1958, p.97). Hence with the inherent properties of signification, movement and structural contrast and transformation, both the visual and the musical elements are capable of narrating sequential events and generating sympathetic emotions in their percipients via signification and meaning.

1.4.3 Premises for Exchanges between the Visual and Musical Arts in the 19th Century

All of the aesthetic and compositional qualities cited above are sufficient grounds for both art forms to draw parallel, analogous narration or depiction of ideas within their separate domains. In a way, it is quite adequate to say that it is possible to "translate" a set of related ideas from the visual or graphical domain to the musical domain. What remains to be desired, is the degree of "efficacy" in such "translations". The deterrent factor that stood in the way of effective graphical-musical translations has always been attributed to the lack of the so-called referential view of meaning - the one-to-one or this-means-that view (Beardsley 1958, p.13). To put it simply, a "signifier" may refer to more than one "signified" idea. If the listener has had no prior knowledge of the title of the piece of music which employs the recurring musical intervals of a third or has not been informed of the source of inspiration for the music, would he have associated that particular musical interval with the idea of the cuckoo? Because the interval of a third occurs frequently in musical works, it may exist to denote many different things other than the mere sound made by a cuckoo (Beardsley 1958, p.14). Such multiplicity in referential or denotative meanings (the signified) for the interval

of a third (the signifier) reduces the efficacy in graphical-musical translations. At times contrary to such referential multiplicity, some signifiers may not even refer to any concrete idea or essence at all. Ironically, however, it is exactly due to this lack of referential specificity in signification of graphical and musical elements that past composers had revelled in composing music that is allegedly inspired by visual art works. It is in spite of this philosophical conundrum of signification or the circumscription about it that these composers were granted the artistic freedom to take inspiration from whichever visual source they fancied and fill in the rest of the music with their own creative imagination.

According to Champa (2000, p.103), the French composer Hector Berlioz exclaimed that one could expect music to have "a mysterious likeness to all possible things," and to be "everything". Here he also mentioned that Berlioz had managed to give "an account (of Ludwig von Beethoven's music) stressing vagueness of signification rather than offering formal explanations". This paradox of non-specificity in signification in visual and musical arts laid the fertile ground for many musical works known to have been inspired by visual experiences not necessarily committed to paintings on canvas. Some of the most famous examples include Beethoven's *Pastoral Symphony*, Felix Mendelssohn's *Fingal's Cave* and Franz Liszt's symphonic poems such as *Les Préludes and Orpheus.*

1.4.4 Liszt’s Musical Proposition, Compositional Discourse and Influences

What Liszt did in his symphonic poems, along with other composers that came after him such as Modest Moussorgsky, Claude Debussy and Paul Hindemith – examples of their works to be mentioned later – was a remarkable step further in the treatment and handling of musical elements: bringing the control and manipulation of musical materials closer to that found in the visual arts. Caballero (2000, p.123) stated that "one of the main reasons Liszt seems to have brought the symphonic poem into being was to test the possibilities of recreating a poetic or intellectual discourse in the "language" of music." The symphonic poem or sometimes referred to as the tone poem, was invented by Liszt to imitate what was thought to be, at that time, the exclusive domain of the visual arts - the "painting" of a

narrative or programmatic discourse. Liszt spoke of "directing the listener's attention not only to the web of the music but also to the ideas expressed by its contours and successions." Caballero also states that "to achieve an intimate union of the musical and the literary, Liszt proposed the use of musical motives that would signify ideas not merely through their pregnant individuality, but through their modes of presentation, transformation and combination." If we replace the word "literary" in the previous sentence with the word "visual", it would not be far-fetched to say that Liszt was essentially trying to fashion his musical materials to stay as true as possible to the visual or literary source of inspiration in his musical "translations". One gets the hint that Liszt is essentially aiming for a more wholesome thematic grasp and development of musical materials throughout the length of his musical compositions in contrast to the more spurious or loose relationships between musical materials which themselves came about in various degree of perceptual tangibility. Indeed, Hindemith's musical transcription of Grünewald's *Isenheim Altarpiece* in his opera and symphony, *Mathis der Maler* is taken by Stechow (1953) as one of the exemplary "musical translations of paintings which preserve essential elements of the underlying work not only in recognizable details but also in terms of structure". In this article he also cited two examples of "interpretations" (Stechow's choice word) of architecture (a genre of visual design) in music built on the premise of the "vague associations between music and architecture", namely, Moussorgsky's *Gate of Kiev* (from *Pictures at an Exhibition*) and Debussy's *La Cathédrale Engloutie* (from his piano préludes). In fact, such structurally and thematically less rigorous musical "translations" of visual designs of the last two examples existed in abundance and are too numerous to cite here. Nevertheless, the kind of structural and thematic "tightness" and coherence of musical elements first envisioned by Liszt can be found echoed in several artistic ideas and works of the modern era.

1.4.5 Referential Specificity and Analogy

Making a brief revisit to the three traits common to both the visual and the musical domains, there is one last trait that has the power of bridging the disparity between the two domains. Colours were originally perceived as visual phenomena caused by light

components of different wavelengths. But it has been slowly absorbed into the musical vernacular as a way to describe different qualitative shades of musical sounds. Unlike signification and structure, form or movement, there seems to be no need for the mental conjuration of an intermediary idea that is required to link a visual object to a corresponding musical object. Interestingly many listeners, amongst them some of the greatest composers such as Alexander Scriabin and Olivier Messiaen, relish the synesthetic idea of hearing certain sounds or musical tones associated with certain visual colours. The phenomenon of sound-colour synaesthesia offers a unique perspective on the “translation" of musical elements to visual ones due to the naturally occurring referential nature of such sensory correspondence. The problem of vagueness in signification and association between visual and musical characteristics is somehow suppressed or minimised in the case of synesthetic relation. Even though different individuals may disagree on what colour a certain sound or musical tone is associated with, in general, there is a consistency with which an individual identifies a pitch as corresponding to a certain colour, for example, the pitch C for the colour green. According to McDonnell (2007), “the one-to-one referential mapping of elements between the visual and musical domains first emerged when Sir Isaac Newton first observe a correspondence between the proportionate width of the seven prismatic rays and the string lengths required to produce the musical scale D, E, F, G, A, B, C (Peacock 1988) in his Opticks (1704)." "Since then, rapid development that expounded on this theory of sound-colour correlation ensued with invention of colour-projection instruments that perform colour-music.” However, it can be too convenient to overlook the significance brought about by this sound-colour correlation theory apart from the one-to-one referential mapping between visual and musical elements. Not only has the correspondence between elements of the visual and musical domains been streamlined down from the messiness of referential unspecificity, this sound-colour theory has also presented a version of the coherency of relationships between translated visual elements as envisaged by Liszt in his symphonic poems albeit in his case, the argument is for musical elements. In other words, musical tones, which initially existed under a specific set of relationships governed by their positions on the

musical scale, have now been translated into visual colours that fall into the strict hierarchy of the colour spectrum. The musical scale and the colour spectrum individually stand for a coherent set of relationships on either side of the visual-musical divide akin to Liszt's proposal of the "poetic or intellectual discourse" and of thematic relationships between his translated musical materials. A lack of such a "set of relations" or "discourse" amongst elements on either the visual or musical domains shall result in a kind of translation whereby the musical tone A is represented by the colour blue while another musical tone B is translated into a geometric shape of a square in the visual domain. To further elucidate this transference of a set of musical relationships to a coherent set of visual relationships, one may invoke the notion of analogy. Through an analogy, a set of relationships between a set of ideas or objects belonging to an elemental form is preserved and recreated using another set of ideas or objects belonging to another elemental form.

It is essential at this point to recapitulate the initial identification of the three traits and their significance that afforded such a vital link between what can be expressed in the visual domain and the musical domain as embodied in Figure 1.1. It is hard not to notice how the historical evolution and debate of the correspondence between the visual and musical arts vaguely follows the descending trajectory of the three characteristics tabled in Figure 1.1. Early in the history of the arts, the property of signification and meaning of visual elements and musical elements had been the main focus for painters and musicians who believed that both art forms strive for the same level of artistic expression and depiction of emotions and ideas. In their artistic correspondence, a point or a sense of convergence between the art forms – as can be inferred from historical art works – was never realised due to vagueness and messiness caused by referential multiplicity in signification. Structural and formal discourses were developed independently within the art forms' own confines while the idea of temporal movement in music and the perceived inability of the visual arts in embodying and depicting this particular aspect offered no help in fostering more cross-discipline dialogues. It is fair to claim that the floodgate of artistic correspondence between the two was flung wide open with the introduction and dissemination of Newton's scientific theory of

sound-colour correlation which finally offered a prospective view of a coherent mapping of relations of elements from one domain to the other.

1.4.6 Modern Artistic Works based on Graphical-Musical Analogy

As it happened, sound-colour correlation theory inspired and prompted many visual artists in the 20th century to "compose" visual art works in analogy to the compositional characteristics and lingual syntax from the musical world, building the foundation and culminating in what had now come to be referred to as "visual music". The basic analogical mapping of musical-to-visual elements initially confined to sound and colour was subsequently enlarged to encompass other aspects of music and visual designs. McDonnell (2007) observed that renowned painters the likes of Vassily Kandinsky (1866-1944), Paul Klee (1879-1940) and Roy De Maistre (1894-1968) "worked with music concepts and ideas, translating them into their own ideas and principles for artistic practise." Other than Roy De Maistre, who devised colour-music codes to assist in his pictorial compositions, most other artists drawn to working out musical concepts and principles into the visual arts were not as specific with regard to the exact correlation between musical and graphical parameters. However, the transformation of musical forms, functions and techniques into graphical equivalence grew tighter and became more comprehensive with artists such as Viking Eggeling and Hans Richter experimenting with new principles, technical devices and techniques drawing parallels with musical counterpoints and orchestration forms. They even went so far as to venture into the medium of film in order to realise the musical aspect of movement in their experimental works. Visual parameters of "instruments", rhythm, dynamics, figures and shape which are analogous to the musical parameters of rhythm, pitch, phrasing and timbre gradually began taking the centre stage in their compositional process. With Walter Ruttmann and Léopold Survage joining the fray, these artists began to put more emphasis into the component of time into their compositions of moving images on film while parameters of visual images continued to be exploited in an increasingly independent nature as would a musical composer do with musical parameters. In his film *A Colour Box* (1935), the kinetic artist and filmmaker Len Lye (1901-1980) was said (McDonnell 2007) to have

"used the soundtrack as a creative base by associating particular shapes with certain sounds, so that there is a loose relationship between sound and image" (Sexton 2003).

All artistic endeavours mentioned in the preceding examples have given us two significant points regarding the correspondence between the visual and musical arts to further ponder upon: (1) Spurred on by Newton's proposal of a direct sound-colour correlation theory, artists have sought to bridging and mapping finer aspects and sets of parameters from the musical domain to the visual domain. However, no transdisciplinary mapping of parameters were absolute and the extent and stringency to which such mappings were attempted were subject to the individual artist's aesthetic needs, mode of expression as well as techniques preferred. In other words, though the coherency between translated aesthetic elements and parameters as well as across disciplines had become tighter since the time Liszt proposed his vision for a clearer musical thematic discourse, a sense of "looseness" in thematic or elemental relationships still linger in the air surrounding the artistic scene. (2) Most transdisciplinary correspondences were lopsided - the majority of them involved visual arts created in reflection of formal and compositional processes of the musical arts but rarely under a reversal of such roles.

1.4.7 Scientific Correlational or Mapping Systems – the Extreme End

On the trail of the first point posited in the previous paragraph, it is worth taking note of recent developments in the field of research regarding the psychophysical relations between colour and sound. There is the expansion on Newton's sound-colour relation by Pridmore (1992) that maps colours of the same hue to pitches of the same tone in different octaves. Others such as Caivano (1994) saw different correspondences between colour and sound by correlating luminosity to loudness, saturation to timbre, and size of colour to sound duration. What is most intriguing about these theoretical findings that may be of interest to the composer is that there seems to be an expanding possibility of associating more visual elements to elements of sound or music beyond the mere scope of colour and sound alone. Paradoxically, while we are blessed with this expanding possibility of visual-musical mapping, there seems to be a counter current of convergence taking place within the

boundaries of a specific field of correlational system. An extreme example of such a correlational or mapping system carried to the height of the utmost impermeability of scientific methods was developed in the field of biomedical engineering where computer softwares (Meijer 1992) are used to map a visual image pixel by pixel into time-multiplexed sound representations. In his experimental system that seeks to map visual images into auditory image representations that may be rewired through the auditory sensory part of the brain of the blind to enable them to "see" those images, Meijer's mapping "translates, for each pixel (of the image), vertical position into frequency, horizontal position into time-after-click, and brightness into oscillation amplitude." At the same time, this trend of development also harks back to the second point precipitated in the last paragraph. It is probably due to the static quality of a visual image that it allows such rigorous mapping from visual elements to sonic elements. It is hard to imagine an equivalent effort in the reverse direction because the addition of a temporal dimension from the musical domain would entail extra layers of complexity in managing tonnes of convoluted translated visual parameters although technological advancement bodes well for future efforts.

1.4.8 Algorithmic Musical Compositions

Despite the empirical tightness of such scientific visual-auditory mapping system, the philistine absolutism of its approach is, however, considered out of step with the artistic pursuit of musical composition. In fact, many composers who espouse mathematical models and approach as a large part of their creative endeavours have had to face the difficult problem of evaluating the aesthetic quality of music generated based on those approaches (Robertson et al. 1998, Moroni et al. 2000, Conklin 2003). Many such composers are often referred to as algorithmic composers due to their reliance on mathematical models (e.g. stochastic processes and Markov chains), knowledge based systems, grammars, evolutionary methods (e.g. genetic algorithm), systems that has the ability to "learn" (e.g. neural network and machine learning), and hybrid systems, in handling large swaths of musical parameters used in their compositions while maintaining minimal human intervention in the compositional process (Cope 2005, Papadopoulus and Wiggins 1999). Such heavy reliance

on the arithmetic capabilities of computers in the process of music composition has in recent decades flourished into a specialised field of research that revolves around the proliferation of computer music systems. Unlike the scientific objectivities held in fields such as in the example of biomedical engineering quoted above, the graphical representation of sounds is obtained via such computer music systems, and is ultimately used as a compositional tool (Lesbros 1996). Under the umbrella of computer music, the world has seen an unparalled explosion in the kind of creativity and innovation of visual-to-sound mappings achieved in the so-called image sonification for musical purpose (Nayak et al. 2003, Kabisch et al. 2005, Yeo and Berger 2005, Wu and Li 2008).

1.4.9 Xenakis – His Compositional Philosophy and Approach

Regardless of the robustness and diversity of visual-sound mappings attainable with the ever-domineering role of computer music systems in the creation of music, it remains debatable on how much or how little human intervention and aesthetic decisions is most desirable in the creation of music as an art form. Whether the art of musical composition still belongs to the intellectual province of composers or should they now be opened up to include people who became the indispensable force and torchbearers behind computer music systems such as computer scientists remains a moot point. Many minders of computer music systems still insist on a human evaluator for measuring the aesthetic qualities of their algorithmic musical creations. Some are mindful of developing methods that hold the prospect of being useful in helping composers get new ideas and inspirations. On the other hand, many a composers have taken to overseeing the computer systems and the algorithmic methods themselves or alternatively work in close collaboration with scientists and mathematicians. However there is an indisputable lack of humanistic perceptual discretion in the treatment of thematic subjects and their graphical relations within an image before it is being mapped into sounds. A pixel on an image of a dog and a pixel on that of a human face that shares the same luminosity, hue and saturation of colour, for example, are perceived no differently from one another to the eyes of a computer system (Wu and Li 2008). We may still be light years away from developing artificial intelligence that recognizes metaphysical relations between

aesthetic objects and translate them into equally intriguing sonic materials. But if we retrace the history that gave birth to algorithmic music composition, we shall have to acquaint ourselves with one of its pioneers, the Greek composer Iannis Xenakis, who used the computer to produce musical materials with which he would later compose. In the case of composers like Xenakis, creative decisions still lie in the hands of the human composer, that "the computer has not actually produced the resultant sound; it has only aided the composer by virtue of its high-speed computations" (Cope 2006). By putting our faith in the human eyes, coupled with the aid of artificial intelligence and the ever-expanding horizon of graphical-sound correlations, there is much room for developing compositional methods based on the human perception of visual images into musical creation which retains a uniquely humanistic and aesthetic dimension.

All in all, the art of creating musical compositions based on literary or graphical properties found in the visual art works have been in practice for hundreds of years. However, most of these artistic endeavours have not taken on a specific focus on translating an integral set of related graphical properties into music which seeks to preserve and reflect analogous relationships between these aesthetic elements. On the other spectrum of visual translation into sound, the approaches have veered on the side of such rigorous scientific methods that have detracted human perceptions of the images' graphical content and the intervention of artistic decisions from composers during the creational process. Examples of composers from the last decades who have taken to striking a balance between a more faithful observance of the graphical constructs of the source of their visual inspirations and subsequently translating and assimilating them into their musical compositions are: John Cage in his composition *Atlas Eclipticalis* (Downes 1970, Pritchett 2000) where he traces a map of the stars on music paper and then turn these graphical scriptions into musical parameters; Xenakis, who, by 1979, had devised and employed a computer system named UPIC to translate graphical sketches into musical sculptures in his *Mycenae-Alpha* (Hugill 2008, p.95, p.182); and Tajuddin in his musical compositions based on a detail study of the arabesque (Tajuddin 2001).

Hence, what the composer intends to explore in this thesis can be considered as an artistic expansion on the efforts and legacies of the above mentioned composers, and in particular, of Xenakis, whose compositional methods for *Mycenae-Alpha* incorporated the use of a computer system, an algorithmic approach to composition and the artistic objective of coherently translating a set of graphical elements into the musical domain.

Primary differences between what shall be explored here and precedent artistic efforts lie in the adopted mode of graphical analysis, the methods of translation between graphical and musical elements and the eventual compositional process as affected by the these two aspects.

1.5 Focus of Study

1.5.1 Figurative and Textural Dialectic

In this thesis, the composer shall attempt to translate visual images into music by focusing on specific graphical perspectives of looking into those images and extract a holistic set of graphical elements and relationships from them. The unique graphical perspective to be adopted in this thesis is the figurative and textural dialectic. Several visual art works that best represent the dichotomous relationship between figurative graphical objects and textural graphical composition are selected. By starting on the most basic of intelligible figurative shapes such as geometrical forms and their antitheses – organic forms, one can investigate the gradation from purely figurative objects to a textural subjugation of these objects in the same visual canvas. The composer shall initially extract graphical features through the figurative-textural dialectical lens and also identify the most basic figurative motifs from the angle of their geometrical or organic orientation.

The research discourse will subsequently venture into investigations of extra-graphical production methods and techniques that gave rise to the unique figurative-textural properties of the visual art works.

1.5.2 Methods of Translation

The extracted graphical features obtained via the analytical dissection of visual art works shall be translated into numeric representation using the numeric system as an

intermediate medium, and then be realised into musical parameters by equating the numeric system (with their arithmetic and calculus properties) to a selection of musical theoretical systems. The translation (or mapping) function between graphical and musical elements via the intermediate numeric medium serves as the pragmatic platform that bridges the conceptual domain of graphical-musical analogy to the compositional realisation of such analogical concepts.

1.5.3 Compositional Process

The compositional process is closely tied to the types of musical materials generated via the specific methods of metaphorical translation. Due to the kind of precise mathematical representation of musical materials available, quasi-algorithmic compositional processes are called for. The detailed processes vary from work to work and are adapted to the particular musical morphologies of compositional materials. These materials are then to be "composed" and incorporated into an integrated metaphorical translation of the whole visual canvas into a musical tapestry.

1.6 Methodology

1.6.1 An Overview

To transcribe any visual art work without a thorough understanding and a unique perspective into its thematic content and graphical construct will not do justice to the artistic aspirations of the visual artist. Though the visual arts have long been a perennial fascination for composers, the difference between other approaches in the canon of visual-art-inspired musical compositions and the current one shall lie primarily in its methodology of transcribing the graphical essence of the visuals to music. In general, the research methodologies employed for this thesis can be divided into three aspects: graphical extraction, graphical-musical analogy and musical realisation. The musical realisation aspect involves the deployment of very broad-based, established theoretical perspectives developed over hundreds of years of musical scholarships; while in the aspect of graphical-musical analogy, it often calls for inventive methods of bridging correlating graphical features to those in the musical system. However, more importantly in the aspect of graphical extraction

- the first methodological step that will more or less dictate the tone and direction of the two subsequent aspects - this thesis is focused on subjecting the common aspect of the figurative and textural dialectic – because almost every piece of graphical design can be viewed from the figurative and textural perspective – from a broad spectrum of visual art works to a set of vigorous graphical analysis. Thereafter the set of unique graphical properties and relationships extracted from the analyses will be assimilated, re-appropriated and applied in the construction of an analogically equivalent musical entity. The act of such a translation must in turn be empirical in its approach; being more than a mere logical or philosophical construction of sound, it has to begin with the end in mind. In other words, musical techniques used must be carefully weighted and chosen by anticipating what the music will sound like in the end. This analogical visual-to-music translation strives to preserve the graphical (pertaining to the most basic elements of visual design e.g. lines and curves) and thematic (pertaining to ideas or objects depicted) essence of a selection of visual art works through the perspective of the figurative and textural dialectical lens. It has to be stressed that it is not the intention of this thesis to invoke extra-graphical references and subjective phenomena perceived in the visual art works into extra-musical equivalences. Any resultant parallelism between such external references and phenomena in the visual art works and those evoked in their corresponding translated musical compositions shall be perceived as purely coincidental or as unintended extraneous impressions that arise out of their noumenal similarities.

1.6.2 Methods of Graphical to Musical Translation

As had been briefly mentioned before, the general methodology employed in this thesis can be divided into three aspects or stages: (i) Graphical Extraction (ii) Graphical-Musical Analogy and (iii) Musical Realisation. Although the entire compositional process for each piece of music that is tied to a particular piece of visual art work customarily follows the trajectory mapped out by the three stages above, it may also assume an erratic, disruptive flow venturing back and forth between any of those three stages. This capricious approach to the conceptual and compositional process is crucial in the aim to impose a conceptual

coherency and link between the visual and the musical art work throughout the entire process. Against the profusion of common, established pragmatic compositional tools and methods available to any music composer today (Cope 1997), such an approach will also help preserve an inwardly referential mode, tone and identity unique to the compositional process and ultimately carry them to their actual manifestation in music.

1.6.2.1 Graphical Extraction

1.6.2.1.1 The Figurative and Textural Dialectic

A figurative object can be defined as something which appear to the senses and to the perception of the mind as an almost independent manifestation of itself. Such a figurative object usually has clear boundaries that mark and separate it from other objects or forms. Due to such properties, graphical figurative objects are commonly more easily grasped by the visual senses and cognitive faculties of the mind and recognised whenever it recurs. A graphical motif with a unique geometric shape or outline for example can be regarded as a figurative object. Other unmistakably figurative forms include depictions of living and non-living forms encountered in everyday life as well as substantive ideas and concepts conjured up or projected in the imaginative realm. To the auditory senses wired to the same cognitive faculties that also interpret perceptual information transmitted from the visual senses, more substantive and tangible musical forms such as a melody, a musical phrase, a harmonic progression or an ephemeral sonic event would count as musical figurative objects. Therefore, contrary to anything that can be defined as figurative, one may regard an almost interminable, self-perpetuating field consisting of homogeneous, modular and often minute components or particles bound by a complex array of relationships as something which is more textural in quality. The fact remains that many of the physical or perceptual objects that one encounters everyday often straddle across the boundary between the figurative and the textural. The divide between the figurative and the textural is often a fuzzy one; and that there can be a huge degree of gradation from one perspective to the other. It is under this dialectical perspective of the figurative and the textural that the composer is going to subject the graphical specimens to analytical dissection. Since both the graphical and musical

elements can be cast under a figurative or a textural dialectical perspective, a chart that seeks to profile the vast spectral terrain of this dialectic has been conceived. Figure 1.2 shows this Pointilistic-Figurative-Textural (PFT) Chart.

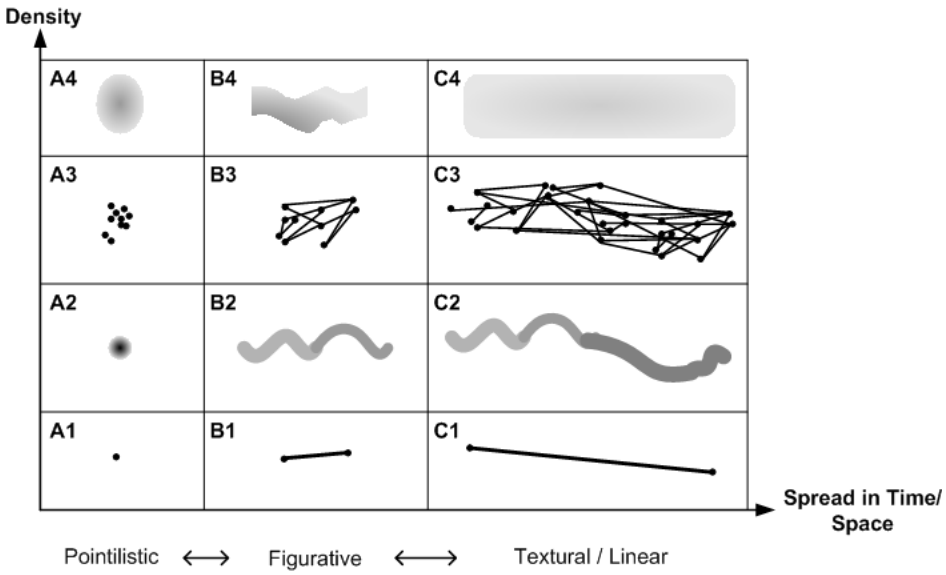


Figure 1.2: Pointilistic-Figurative-Textural (PFT) Chart

The PFT Chart starts off with a pointilistic representation of an aesthetic object or element. This element can be equated to different concepts such as a dot in the graphical domain, or a definite pitch in the musical domain. Traversing the spatial or temporal dimension, an assemblage of pointilistic elements gradually grows into a figurative entity that can be a depiction of an object in the graphical domain or a melodic motif in the musical domain. A further proliferation of figurative entities multiplied in time or space shall precipitate in a textural canvas either extended in time or space. On the other hand, ascending the vertical dimension, basic elements gradually increase in contrapuntal density. The division of the PFT Chart into different regions is to make it easier in the task of identifying the figurative-textural characteristic of a given graphical or musical component. Hence in the beginning of every chapter of this thesis, the thematic components of a piece of visual art work shall first be analysed under the figurative-textural perspective and categorised accordingly, often with the aid of the PFT Chart.

1.6.2.1.2 Graphical Extraction into an Intermediate Medium

After an analysis of the graphical features and properties of a piece of visual art work according to the figurative-textural dialectic, these features and their graphical relationships have to be extracted into some form of concrete and cognitively palatable information. One such viable medium of representation for this analytical information is numbers. To a certain extent, it is possible to translate the graphical essence of density, space and time into numerical representation. Another reason for supporting the use of a numeric system as a suitable medium of retainer of graphical information is its arithmetic and calculus capabilities which can convey more intricate graphical relationships. Furthermore, many musical theoretical systems (to be explained later) employ mathematical representations for musical parameters such as pitch, intervals, duration, frequencies and sonic density. These factors made a strong case for using numeric representation as an intermediate medium between the graphical and musical domains.

1.6.2.1.3 Aesthetic Objects as Physical Objects and Perceptual Objects; Phenomenal Subjectivity and Objectivity

In certain chapters of this thesis, figurative entities in the visual art works are also considered and classified under different perspectives as aesthetic objects (Beardsley 1958, p.29). This allows the figurative objects to be viewed under their dual perspectives as physical objects and perceptual objects. The figure of a dog on an oil painting, for example, is perceived by the percipient as a portrayal of the dog as an animal. Alternatively, this figure of a dog exists in its physical reality as nothing but a few dabs of coloured paints. On another level, the perceptual object of a dog may also evoke certain emotions, sentiments or metaphysical ideas related to it such as friendliness, warmth or a feeling of sadness for its being. Such extraneous associations of feelings and ideas to the figure of the dog are said to be phenomenally subjective as these feelings and ideas are personal to its percipient and may vary from one individual to the next. On the other hand, phenomenal objectivity refers to how the physical existence of the dog as a few dabs of oil paint can be physically felt by the

hands of a person. How a few small, uneven, dry lumps of oil paint feel to the hands of different people may not vary too much and thus are said to be phenomenally objective.

By analysing graphical aesthetic objects extracted from visual art works under such physical, perceptual and phenomenal perspective, it allows one to construct an extra layer of analogical possibilities between graphical and musical elements. An example would be an extrapolation of the physical objectivity of black ink on a textural canvas to ideas regarding the painterly techniques and methods that had made it happen. Hence this can lead to an analogical map to the methods of sound production on a piece of musical instrument. As one shall see, these perspectives have led the composer to the conception of musical compositions that encompass more than just pitch structure, harmony and rhythms but also the aspect of instrumental techniques, all of which can be traced back to its source of metaphor in graphical forms.

1.6.2.2 Graphical-Musical Analogy

Once a thorough graphical analysis and extraction has been performed, a system of analogical mapping between those graphical information and musical concepts or models is required. It is difficult to formulate a comprehensive and definitive approach to such an analogical mapping in part due to the many ways of looking at music. History has bombarded us with endless propositions of musical theoretical models, concepts and systems while to develop newer ones or to expand on existing ones will always be a continuous intellectual pursuit in the musical field. One can nevertheless work this to his advantage by appropriating some of the more established musical theoretical models in developing analogical mappings that best serve the graphical characteristics of individual art works. Some of the recurring compositional or theoretical models employed in this thesis include Schoenberg's dodecaphonic principles, methods of integral serialism, musical set theory (Forte 1973) and spectralism (Cope 1997). Another reason for choosing these musical models in the mapping approach and musical realisation is for the simple fact that musical elements (e.g. pitches, intervals, rhythm and harmony etc.) can often be represented in numerical forms and thus render themselves well for mathematical manipulation. Ultimately,

it is the numerical medium that forms the foundation of the analogical bridge between graphical and musical elements.

The types of musical theoretical models and their numeric representations that can be found in regular recurrences throughout the chapters are introduced here. The tonal system proposed by the father of 12-tone music, Arnold Schoenberg, as is suggested in its name, is based on the concept of deploying all twelve tones or pitches (in this thesis, the terms "tone" and "pitch" are used interchangeably) of the equal-temperament scale. Hence the convention of numeric representations of each of these twelve tones, shown in Table 1.1, is adopted throughout this thesis. A similar mode of numeric representation for musical intervals is also shown in the table.

Table 1.1: Musical Pitches and Intervals with their 12-tone Numeric Representations

Pitches	Numeric Representation
C	0
C-sharp	1
D	2
D-sharp	3
E	4
F	5
F-sharp	6
G	7
G-sharp	8
A	9
A-sharp	10
B	11

Intervals	Short-form	Numeric Representation
Perfect Unison	P1	0/12
Minor 2nd	m2	1
Major 2nd	M2	2
Minor 3rd	m3	3
Major 3rd	M3	4
Perfect 4th	P4	5
Augmented 4th	A4	6
Perfect 5th	P5	7
Minor 6th	m6	8
Major 6th	M6	9
Minor 7th	m7	10
Major 7th	M7	11
Perfect Octave	P8	0/12

Another theoretical system is the pitch class set theory (Forte 1973) that classifies any collective of pitches into fundamental pitch orders called "pitch class sets". With each pitch class set, there is an accompanying indicator called the "interval vector" which carries information on the number of intervallic relationships that can be formed between any two pitches within the set. A table of these pitch class sets involving a 3-pitch collective, 4-pitch and 5-pitch collectives are shown in Table 1.2. Each of the 6 numerals under the interval vector stands for the number of counts of the 6 basic musical intervals - m2, M2, m3, M3, P4, A4 and their inversions. Pitch class sets are useful as a tool to identify and tag specific

harmonic colours to a musical chord or simply a collection of related pitches and with this, to facilitate the creative and compositional manipulation of them.

A third musical perspective explored and appropriated in the thesis is one which is built on the scientific basis of sound or timbre pertaining to their frequency components and proportions – the harmonic series. This spectral perspective of sound has formed the compositional basis for many so-called spectralist music and it is based on the spectral construct of musical pitches or partials as shown in the example of the harmonic series of the tone C in Figure 1.3 (Encyclopædia Britannica 2010). The unique characteristic of a sound or timbre is attributed not only to the type and number of partials within its spectral construct but also to the intervallic structure that governs the distribution of these partials.

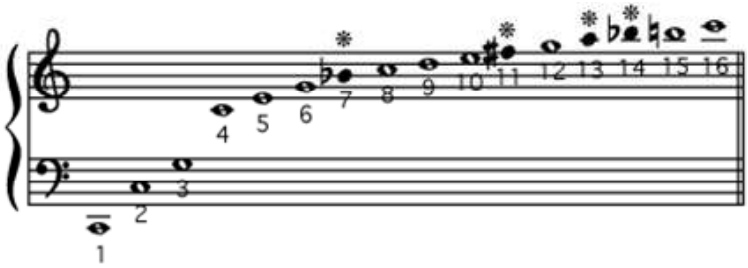
Table 1.2: Musical Pitch Class Sets

Pitch-Class Set	Best Order	Interval Vectors
3-1(12)	0,1,2	210000
3-2	0,1,3	111000
3-3	0,1,4	101100
3-4	0,1,5	100110
3-5	0,1,6	100011
3-6(12)	0,2,4	020100
3-7	0,2,5	011010
3-8	0,2,6	010101
3-9(12)	0,2,7	010020
3-10(12)	0,3,6	002001
3-11	0,3,7	001110
3-12(4)	0,4,8	000300

Pitch-Class Set	Best Order	Interval Vectors
4-1(12)	0,1,2,3	321000
4-2	0,1,2,4	221100
4-3	0,1,3,4	212100
4-4	0,1,2,5	211110
4-5	0,1,2,6	210111
4-6(12)	0,1,2,7	210021
4-7(12)	0,1,4,5	201210
4-8(12)	0,1,5,6	200121
4-9(6)	0,1,6,7	200022
4-10(12)	0,2,3,5	122010
4-11	0,1,3,5	121110
4-12	0,2,3,6	112101
4-13	0,1,3,6	112011
4-14	0,2,3,7	111120
4-Z15	0,1,4,6	111111
4-16	0,1,5,7	110121
4-17(12)	0,3,4,7	102210
4-18	0,1,4,7	102111
4-19	0,1,4,8	101310
4-20(12)	0,1,5,8	101220
4-21(12)	0,2,4,6	030201
4-22	0,2,4,7	021120
4-23(12)	0,2,5,7	021030
4-24(12)	0,2,4,8	020301
4-25(6)	0,2,6,8	020202
4-26(12)	0,3,5,8	012120
4-27	0,2,5,8	012111
4-28(3)	0,3,6,9	004002
4-Z29	0,1,3,7	111111

Pitch-Class Set	Best Order	Interval Vectors
5-1(12)	0,1,2,3,4	432100
5-2	0,1,2,3,5	332110
5-3	0,1,2,4,5	322210
5-4	0,1,2,3,6	322111
5-5	0,1,2,3,7	321121
5-6	0,1,2,5,6	311221
5-7	0,1,2,6,7	310132
5-8(12)	0,2,3,4,6	232201
5-9	0,1,2,4,6	231211
5-10	0,1,3,4,6	223111
5-11	0,2,3,4,7	222220
5-Z12(12)	0,1,3,5,6	222121
5-13	0,1,2,4,8	221311
5-14	0,1,2,5,7	221131
5-15(12)	0,1,2,6,8	220222
5-16	0,1,3,4,7	213211
5-Z17(12)	0,1,3,4,8	212320
5-Z18	0,1,4,5,7	212221
5-19	0,1,3,6,7	212122
5-20	0,1,3,7,8	211231
5-21	0,1,4,5,8	202420
5-22(12)	0,1,4,7,8	202321
5-23	0,2,3,5,7	132130
5-24	0,1,3,5,7	131221
5-25	0,2,3,5,8	123121
5-26	0,2,4,5,8	122311
5-27	0,1,3,5,8	122230
5-28	0,2,3,6,8	122212
5-29	0,1,3,6,8	122131
5-30	0,1,4,6,8	121321
5-31	0,1,3,6,9	114112
5-32	0,1,4,6,9	113221
5-33(12)	0,2,4,6,8	040402
5-34(12)	0,2,4,6,9	032221
5-35(12)	0,2,4,7,9	032140
5-Z36	0,1,2,4,7	222121
5-37(12)	0,3,4,5,8	212320
5-38	0,1,2,5,8	212221

	Interval Vectors
Prime	m2,M2,m3,M3,P4,A4
Inversion	M7,m7,M6,m6,P5,A4



** Partials whose pitches do not accurately represent any note of the equal-temperament scale. They are approximations.*

Partials	Interval between Partials
1	Perfect Unison
2	Perfect 8ve
3	Perfect 5th
4	Perfect 4th
5	Major 3rd
6	Minor 3rd
7	Minor 3rd
8	Major 2nd
9	Major 2nd
10	Major 2nd
11	Major 2nd
12	Minor 2nd
13	Major 2nd
14	Minor 2nd
15	Minor 2nd
16	Minor 2nd

Figure 1.3: The Harmonic Series (On the Fundamental Tone C)

1.6.2.3 Musical Realisation

When the metaphorical mapping between the graphical and the musical concepts has more or less taken shape, the musical concepts, often already in the form of mathematical representations will have to be realised in musical notation. These sets of musical concepts have invariably taken the forms of pitch, intervallic, melodic, rhythmic and harmonic constructs in the vertical and horizontal contrapuntal dimensions during their conception and now these constructs shall be made to converge in the music actualisation process. Throughout the chapters, one shall most often find that these elemental constructs of music are first realised in small, manoeuvrable, replicable musical modules. In construction of the larger textural musical canvas, these musical modules are weaved together bit by bit and strand by strand. After the musical canvas have been weaved out in its entirety, it shall then be moulded and sculpted upon to give it more musical contour and definition in terms of musical aesthetics. It is in this final stage of composition that the composer shall more

consciously exercise and exert a greater proportion of artistic intervention and control over the aesthetic outcome of the music.

1.6.3 Selection of Visual Art Works

Due to the vastness of the morphological diversity spread of in the PFT chart, it is only possible to explore a narrowly defined area on the chart in the scope of this thesis. The focus will be on the region (around B1-C4) where there is a constant, rigorous dialogue between figures and textures and where there is still a rather clear structural significance of points and their spatial distribution and, at times, when they dissolve into denser, convoluted inseparable forms. In other words, in this particular region on the PFT chart, when a figurative motif of a considerably simple construct in the B region is further elaborated upon, or densely juxtaposed in a much larger continuum of time or space into the C region, a more textural construct began to emerge. Before visual art works were selected for translation, there is another point to consider pertaining to the viability of musical realisation. Due to the employment of an intermediate numeric medium which will link the graphical concepts and relationships extracted from the art works to their analogical musical concepts, one may need to start off on graphical figures which renders well to mathematical representation. Geometric shapes were what came to mind naturally as they are, in themselves, almost perfect graphical conceptions based on definitive sets of mathematical rules. Guided by this cue of the geometric figure, one is inevitably led to consider what stood as its diametrical opposite - the organic figure. Organic shapes with their mathematically more complex or unpredictable curvilinear lines, appear to be more complicated in its composition than geometric shapes. Hence it became increasingly interesting to explore the elusive link between geometric and organic figures, as well as the geometric-organic duality manifested in many other forms of figurative objects. This focus on the figurative-textural and the geometric-organic dialectic is to inform our analytical discourse in the selection of suitable visual art works. Having plundered through the history of the visual arts from around the world, it is no coincidence to find that, arising from their cultural specificities, art works from 3 disparate cultural regions of the world – from the Western, Middle-Eastern to the Far-